ASSEMBLING AN EXPANDED SYSTEM-80 MODEL 1 COMPUTER SYSTEM

In order to run many of the more serious software programs on our System-80 Model 1 computer, it must be "expanded" by the addition of an expansion interface unit, additional memory, one or more floppy disk drives, and perhaps a printer. This booklet is designed to show you how to assemble such an expanded hardware system.

1. General comments

First of all, we should perhaps make a few general comments about computers and peripherals, and the way they like to be treated.

Basically, computers and their peripherals don't like a lot of heat or dust. Nor do they like sharp physical shocks, like being dropped on the floor. So your computer system should be located in a clean, fairly cool place, preferably out of direct sunlight and supported by a solid table or bench.

The size of the table or bench will depend upon the number of components in your system. For a typical system with two disk drives and a printer, we recommend a table of normal height with a top about 800-900mm deep, and at least 1700mm wide.

If your system has disk drives and a printer, it would be wise if you ensure that the operator refrains from smoking while he or she is actually using the equipment. Cigarette ash can do nasty things to the innards of disk drives, to the disks themselves, and to the printing mechanism of a printer!

On the other hand, if your system is to be used for lengthy periods, it would be a good idea to get the operator a really comfortable chair. A comfortable operator will not only be happier, but also more productive!

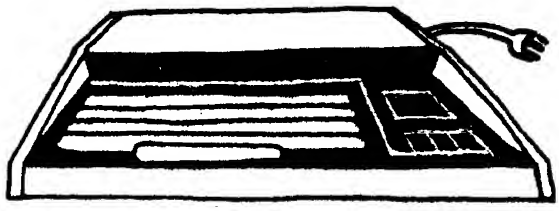
2. Assembling a typical expanded system:

Let's consider first the most common level of expansion of the System-80, as required for most business software. This is where the basic machine is given 16K bytes of extra memory, two 5-1/4in floppy disk drives, and a dot matrix printer. After we've looked at what is involved in setting up this sort of system, we'll look briefly at some of the possible variations.

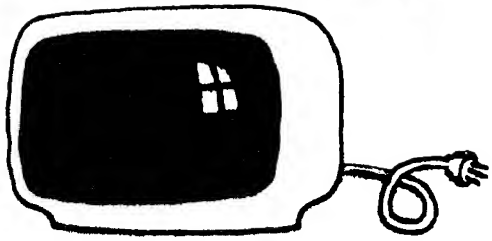
Overleaf, you'll find listed all of the parts you'll need for a typical expanded system. You can use this for three things: as a buying guide, as a checklist and as a reference to show what each of the bits looks like (if you haven't seem them before). So won't you join us?

Here are the parts needed for a typical expanded System-80:

the 16K SYSTEM-80 itself:
(X-4005)

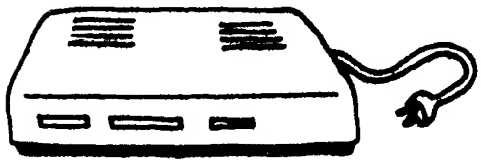


a video monitor:
(X-1196)



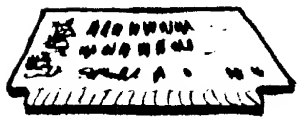
and its video cable:
(comes with X-4005)

the S-100 Expansion Unit:
(X-4010)

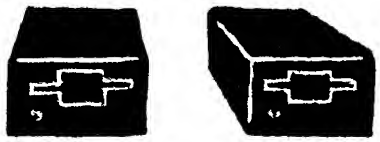


its interface cable:
(comes with X-4010)

and a RAM expansion card:
(X-4016)

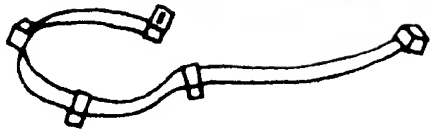


Two mini-floppy disk drives:
(2 x X-3230)

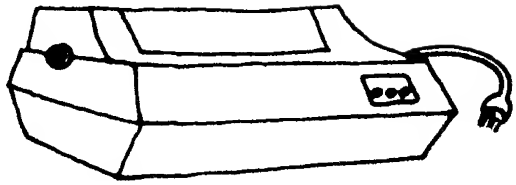


their matching power supply:
(X-3234)

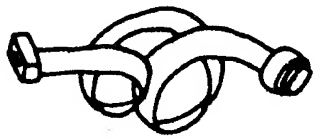
and a "daisy-chain" cable:
(X-3232)



Together with a printer:
(this is X-3255. You may
alternatively want X-3265,
a word processing printer)



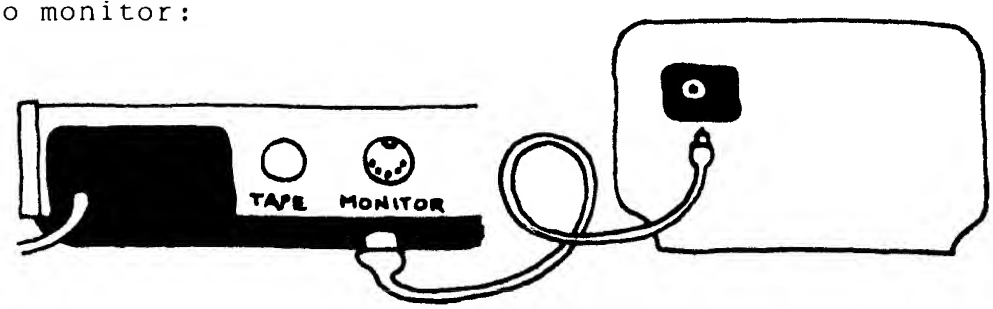
And finally a printer cable:
(X-4014)



Now let's take the assembly step-by-step:

(a) Connecting the computer and video monitor

This is the easy part. Simply take the video cable (it has a small 5-pin "DIN" socket at one end, and an "RCA" type plug at the other), and use it to link the MONITOR socket on the rear of the computer with the video input socket on the rear of the video monitor:

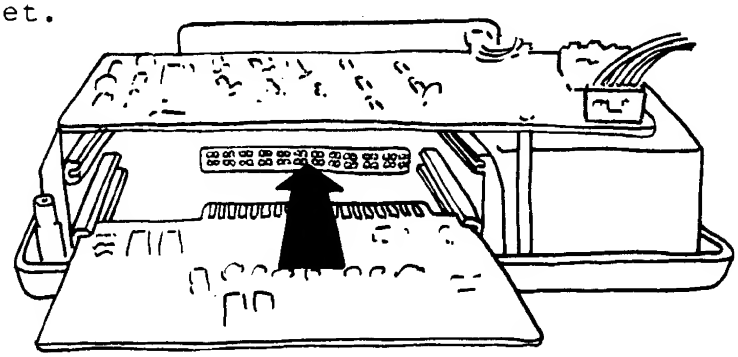


(b) Fitting the memory card to the expansion unit

This is a little tricky, so take care. First, turn the expansion unit upside down and with a screwdriver of the type used for Phillips-head screws (with a "+" head rather than a slot), undo the screws which hold on the top cover. These are the five screws in the deeply-recessed holes: one in each corner, and one in the centre just to the rear of the label.

Now turn the unit up the right way and remove the top cover, by pulling it upward while gently pressing inwards the lower front to release a small moulded-in clip. The cover will still remain connected to the rest of the unit, by a cable which leads to the RS-232C socket, so just rest it on the right-hand end for a moment. Turning now to the RAM card, notice that it has a double-sided 100-way edge connector along one of the long sides, and that all of the components are on one side.

In the expansion unit, you will see its main printed circuit card on the top. Beneath this you will see spaces for two further plug-in cards, with moulded guide slots on each side and 100-way sockets at the rear. Take your RAM card, and plug it into either of these spaces with component side UP. Make sure that it is in the guide slots squarely, and that it mates properly with the rear socket.

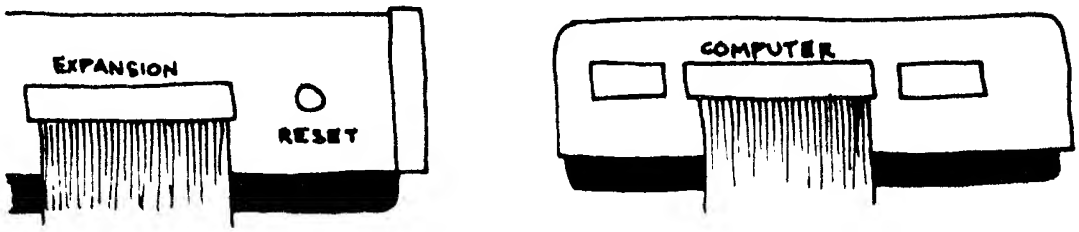


Now you can refit the cover!

(c) Connecting the computer and expansion unit

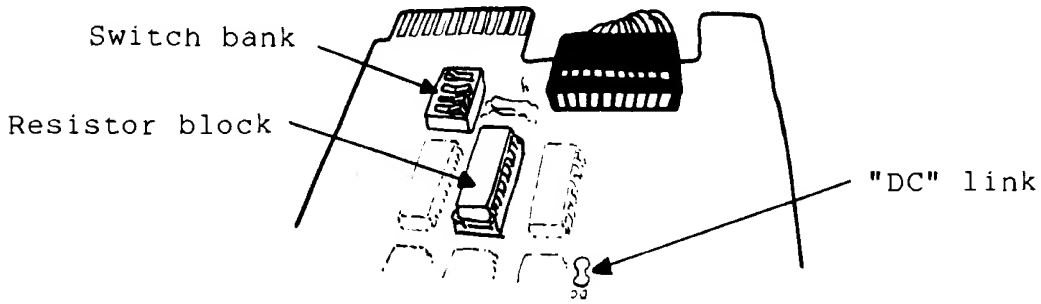
The expansion unit normally goes behind the computer, and a bit to the left so that its centre connector (the one marked COMPUTER) is lined up with the EXPANSION connector on the rear of the computer. These two connectors are then linked together using the expansion cable. Make sure it has NO twist in it!

back of System-80 and Expansion Unit:



(d) Setting the disk drives up properly

This is again a little tricky, so take care. Turn both drives upside down with their fronts facing you, and remove the four screws on each which fasten its case bottom. Now remove the bottom plates, to reveal their printed circuit boards.



At the left rear, just to the front of the edge connector, you will find a small bank of four switches. On one drive, set switch "1" to ON, and the other three to OPEN; this will become your "Drive 0". On the other drive, set switch "2" to ON, and switches 1, 3 and 4 to OPEN; this will become your Drive 1. At this stage you should label the two drives "0" and "1".

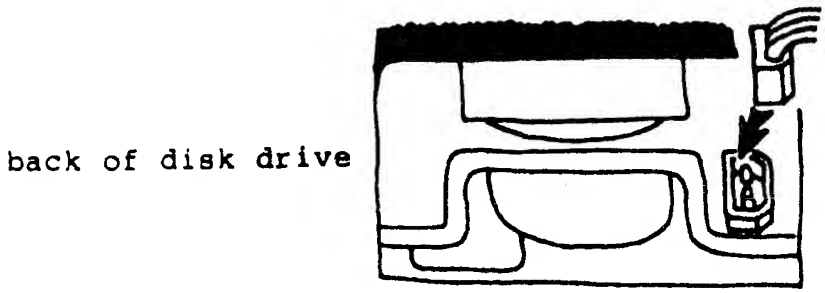
Now find the plug-in terminating resistor blocks, which are immediately in front of the two resistors at the right of the four-way switch blocks you just set. The resistor blocks look like integrated circuits, except that they are blue. Unplug the block in your Drive 0 ONLY, and store it as a spare part.

Again move one IC position to the right, and another towards the front, where you will find a 74LS00 integrated circuit. Just to the right of its rear end, you will find two small round soldered pads, with a short, narrow copper track between them and the letters "DC" nearby. Cut this short track carefully with a knife or razor blade, on BOTH drives.

Now you can replace the bottoms of the drive cases...

(e) Hooking up the disk drive power supply

The power supply runs both disk drives. It has two output cables attached to it, each of which ends in a four-pin plug. These plugs mate with the sockets on the drives, at the rear left. Note that the plugs and sockets are polarised: one side has chamfered corners. Make sure that you mate them correctly; you don't need excessive force if you do. It doesn't matter which cable is used for each drive -- they're both the same!

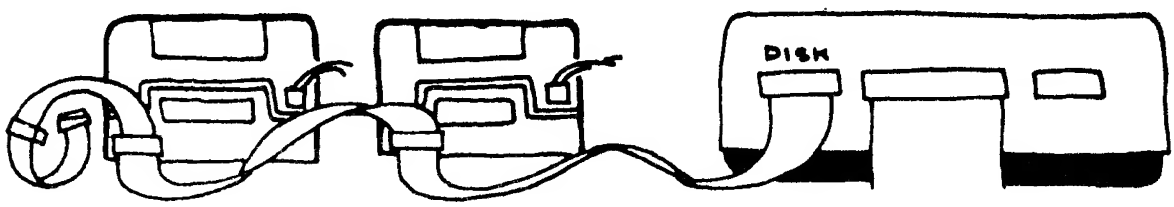


We suggest that you put the disk drives to the left of your expansion unit, with the power supply either well behind them or underneath the table on the floor. You can have one drive standing on the other, if you wish, for compactness. But if you do so we suggest that you use the rubber feet supplied, to make the upper unit secure and improve ventilation.

(f) Connecting the drives to the expansion unit

The drives connect to your expansion unit via the "daisy-chain" cable. This has four edge connectors spaced from one end, for up to four drives, and a single edge connector at the other. This mates with the left-hand connector on the expansion unit, the one marked "DISK", with the cable leaving the connector from the bottom.

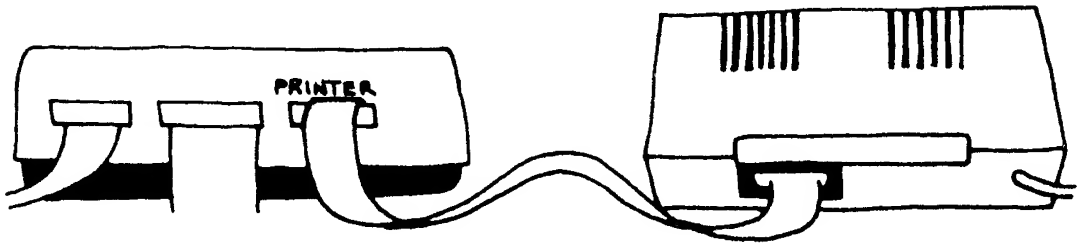
Use the first drive connector along the cable for your Drive Ø, and the next for your Drive 1. The connectors should only go on one way, as they have a polarising wedge which mates with the slot cut in the drive's connector. Ignore the extra cable and connectors for now -- these are for adding further drives later, if you ever need them!



(g) Connecting the printer to the expansion unit

The logical place for the printer is at the right of the expansion unit. It connects to the expansion unit via the printer cable, which has an edge connector at one end and a

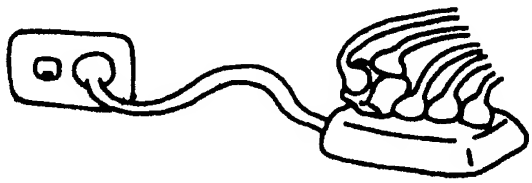
"57N-series" 36-way plug at the other. This plug mates with the socket on the rear of the printer. The edge connector mates with the right-hand connector on the expansion unit, the one marked (logically enough) "PRINTER".



Note that with current cables, the expansion unit connector attaches with the cable coming from the TOP. This means that you will have to bend it down in order to fit the small decorative cover which clips over the connectors on the front of the expansion unit.

(h) Connecting up the mains power

By this stage you've got no less than 5 power cables, each of which has a plug looking for an outlet! Luckily none of the equipment draws much power, however, so you can easily get around this minor problem by using a 4-way outlet unit, together with a double adapter. Or if you don't like double adapters, you can replace one of the plugs with an adapter plug so that the fifth plug can fit into it in "piggyback" fashion.



We suggest that you put this "plug farm" under the rear of the table, where people won't trip over it. Then your system is fully assembled.

3. Assembling other levels of system:

Most people use the typical system whose assembly we have just described. However in case your system is to be a little different, here are a few helpful comments regarding variations to the basic theme.

(a) If you only have one disk drive

Here you can follow the basic procedure described in section 2(d) above, treating your single drive as Drive Ø except that you don't remove its terminating resistor block. But cut its "DC" link, and set switch "1" to ON with the others OPEN. The drive can connect to any of the four connectors on the daisy-chain cable, as you wish.

(b) If you have more than two disk drives

Here you again follow the same basic procedure given in section 2(d), cutting the "DC" links on all drives and setting the small switches on each drive. Hence your third drive (Drive 2) should have switch 3 set to ON, and 1,2 and 4 set to OPEN. Similarly if you have a fourth drive (Drive 3), it should have switch 4 set to ON and 1,2 and 3 set to OPEN.

Note that the terminating resistor blocks should be removed from all except the last drive on the daisy-chain cable, so that only Drive 2 will have the block for a 3-drive system, and only Drive 3 for a 4-drive system.

Of course if you have a third or fourth disk drive, you will need a second drive power supply.

(c) If you want 48K bytes of RAM memory

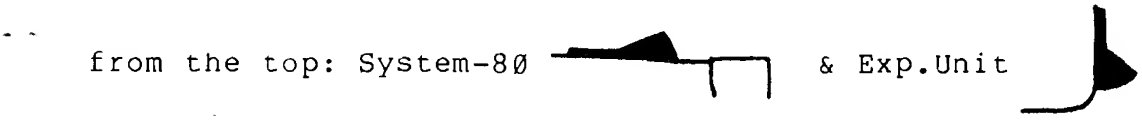
With the basic X-4016 RAM expansion card, you get 16K bytes of memory additional to the 16K already in the X-4005 computer. This gives a total of 32K, sufficient for many purposes. However there are sockets on the X-4016 card for a further 16K of RAM chips (integrated circuits), to expand if you wish to the maximum figure of 48K. The additional memory chips are available as the 16K Memory Expansion Kit, Cat. No. X-1186.

If you want a 48K system, obtain one of these kits and install the chips carefully in the row of empty sockets on the X-4016 card, before you fit the card into the expansion unit according to section 2(b) above. Make sure that you line up the chips so that they are the same way around as the first row, with the "notched" ends away from the edge connector side of the card. Also take care not to bend the pins as you plug the chips in. The chips are all identical, and may be inserted in any order.

4. Turning on the power to your expanded system

With an expanded computer system the power should always be turned on to the various components in a particular order, to make sure that everything get off on the "right foot". The correct order is disk drives, video monitor and printer first, then the expansion unit, and finally the computer.

This may sound complicated, but it's really quite easy to do. Simply make sure that the rocker switches on the expansion unit and computer are both OFF, before you turn on the power at the master power point:



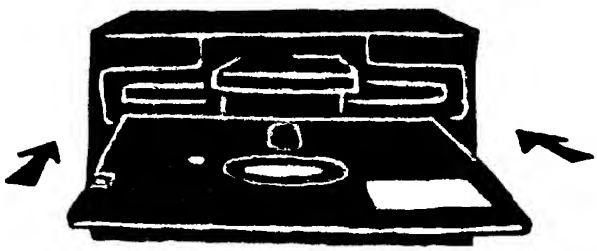
Now you can turn on at the power point. Then you can turn on the expansion unit, via its rocker switch, and put your "master" or "system" floppy disk (the one with your disk operating system, or "DOS"), into Drive Ø. Finally you can turn on the computer via its rocker switch, whereupon Drive Ø should spring into life to load in the DOS and "boot up" your system.

Oh, yes, there's a further point. Although your printer has been turned on at the power point, it too has a power switch. This is on the left-hand side for the X-3255, and at the left rear of the X-3265. Don't forget to turn it on here as well! Note too that the printer will have to be set to its "ON LINE" or "SELECTED" mode, so that it is ready to receive material from the computer. This is done by pressing the SEL or ON-LINE button on the front control panel, which will cause the adjacent green LED lamp to glow.

There is also a correct way to turn off the system. This is to turn off the computer first, then the expansion unit, and finally the rest of the equipment. BUT NOTE that before turning off anything, you should first remove your floppy disks from the drives. Turning off with disks still in the drives can cause them to be corrupted!

5. Inserting your floppy disks in the drives:

To insert your floppy disks into the drives, lift the drive latch bar up until it stops. Then remove the disk from its envelope and position it squarely in front of the slot, with its label side up and with the radial cutout slot towards the drive. Now push the disk in gently, until it will go no further. Finally lower the latching bar, pressing it down until it hits the stop.



To remove a disk from the drive, open the latch bar and gently grip the disk in the centre between thumb and forefinger. Then pull in gently out, taking care not to buckle or twist it in the process.